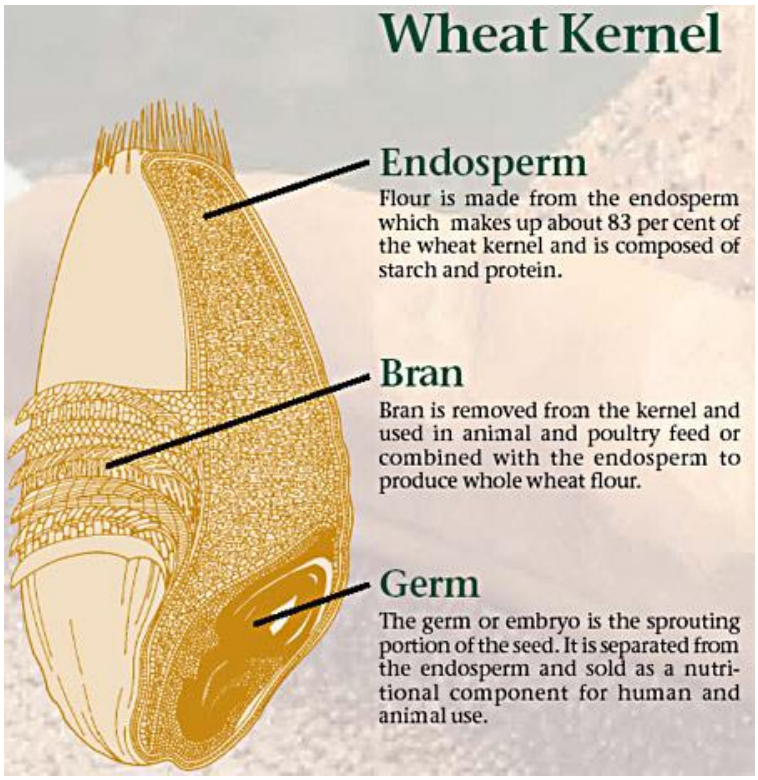
Oxygen Calorimetry—Part 2

A few weeks ago, we learned how to determine the caloric value of substances and tested Lindeman's 10 percent transfer rule. Today, we will use this method to test resource/energy allocation of seeds. We will examine three parts of a wheat seed and compare their caloric contents: 1) the bran, or outer coating of the seed 2) The germ, or the developing plant embryo, and 3) the flour, made from the endosperm which is the nutrition source for the developing embryo. See the diagram below for more information about these components:



For this lab, you will need to perform your benzoic acid standardization and then form 1 g pellets of each of the 3 samples (wheat germ, bran, and flour). Refer to the previous O_2 bomb calorimetry lab for the procedure.

** Students had trouble with calculating W last time, so here is clarification. Use the provided W (2416 cal/◦C) to calculate the caloric content of your benzoic acid (BA) sample. Once you calculate the caloric content of your benzoic acid, plug it into the following formula to calculate W for your 0_2 bomb calorimeter: W= ((wt (g) of BA sample)*(caloric content of BA)) / Δ T (◦C) for BA sample. Once you obtain the new W, use that value when calculating the caloric content of the wheat germ, bran, and flour samples.

Show the calculation for your W:

Homework assignment (Due in lab the week of Dec 9th)

1.) Below, make a hypothesis for which of the three will have the highest, second highest, and third highest energy (caloric) content and state why (3pts):

1.

2.

3.

2.) Fill in the table below (1pts):

	Benzoic Acid	Wheat Germ	Wheat Bran	Wheat Flour
Sample wt (g)				
Ash wt (g)				
Ash-free wt (g)				
Initial T (◦C)				
Max T (◦C)				
Δ T (◦C)				
W				
Calories/g				

4.) Show calculations for the caloric content of each sample below (3 pts):

5.) Were each of your three hypotheses supported? If not, why do you think this is? If so, what alternative explanation(s) could be responsible aside from the one you proposed? (3 pts)